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Term: L10 and (estimat$4 or approximat$4 or gues$6 or comput$4) near3 (gradat$6 or ton$6 or intensit$5)

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L11	L10 and (estimat$4 or approximat$4 or gues$6 or comput$4) near3 (gradat$6 or ton$6 or intensit$5)	39	L11
L10	l4 and @ad<20000825 not l8	545	L10
L9	l8 and @ad<20000825	104	L9
L8	l5 and l6 and l7	150	L8
L7	(color or hue or tint or tinct$4 or chroma$8) near5 (corect$4 or adjust$5 or modif$7) near5 (gradat$6 or densit$5 or ton$6 or intensit$5)	6591	L7
L6	(color or hue or tint or tinct$4 or chroma$8) near5 (corect$4 or adjust$5 or modif$7) near5 (patch or reference or chart or image)	9507	L6
L5	(patch or reference or chart or pattern or target) near4 (read$4 or scan$4 or calibrat$4) near8 (grada$5 or densit$5 or ton$5 or intensi$6)	6999	L5
L4	L3 and l2 and l1	891	L4
L3	(color or hue or tint or tinct$4 or chroma$8) near5 (corect$4 or adjust$5 or modif$7) near7 (patch or reference or chart or image)	10592	L3
L2	(color or hue or tint or tinct$4 or chroma$8) near5 (corect$4 or adjust$5 or modif$7) near7 (gradat$6 or densit$6 or ton$6 or intensi$7)	7074	L2

L1	(patch or reference or chart or image) near7 (read$4 or scan$4 or calibrat$4) with (grada$5 or densit$5 or ton$5 or intensi$6)	33711	L1

END OF SEARCH HISTORY

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L9: Entry 101 of 104 File: JPAB Aug 18, 1995

PUB-NO: JP407222002A
DOCUMENT-IDENTIFIER: JP 07222002 A
TITLE: DENSITY ADJUSTMENT DEVICE IN COLOR IMAGE FORMING DEVICE

PUBN-DATE: August 18, 1995

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APPL-NO: JP06012900
APPL-DATE: February 4, 1994

INT-CL (IPC): H04 N 1/46; B41 J 2/52; G03 G 15/01; H04 N 1/29; H04 N 1/407

ABSTRACT:

PURPOSE: To make picture quality stable by enhancing color reproducibility of a very low density part.

CONSTITUTION: A built-in density pattern signal generating means is provided in the adjustment device, which reads a black level pattern generated by the overlapping development of Y, M, C colors at a very low density based on a density pattern signal from the density pattern generating means, compares the read pattern with an object pattern and implements gradation correction, level adjustment of a reference pattern signal in pulse width modulation, distance adjustment between a sensing material and a developer magnet roll or fog potential adjustment at least by one of control of charging potential, development bias and exposure based on the result of comparison.

WEST .

First Hit Fwd Refs

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L11: Entry 5 of 39 File: USPT May 7, 2002

DOCUMENT-IDENTIFIER: US 6384895 B1
TITLE: Image correction method

Application Filing Date (1):
19990112

Brief Summary Text (21):
It is preferable that a plurality of gray charts including a first gray pattern formed by C, M and Y and a second gray pattern formed by K in such a manner that a required color tone of the first gray pattern is realized and corresponding to different densities are prepared, the density of each gray chart is read by a color scanner to measure characteristics of reflection intensities with respect to wavelengths, and a CMS table to which a reference is made when the CMS conversion is performed is corrected in accordance with the obtained characteristics of the reflection intensities.

Drawing Description Text (11):
FIG. 10 is a density calibration chart;

Detailed Description Text (3):
The schematic process for printing an image according to this embodiment will now be described with reference to FIG. 1. Initially, image data supplied from a client computer 1 is RIP-developed by a RIP (Raster Image Processor), for example, a work station. A predetermined chart which is set by a printer engine 3a of a printer 3 is printed by a recording portion 3b. The printing density of the printed chart 4 is measured by a scanner 5 so that a result of the measurement is fed back to the printer engine 3a. As a result, a correction table in the printer engine 3a is modified so that image data is corrected. Finally, corrected image data is printed.

Detailed Description Text (34):
A density calibration chart with which the density calibration is performed is shown in FIG. 10. As shown in the drawing, the density calibration chart is formed by a plurality of rectangles (hereinafter called "color patches") printed output for each of C, M and Y in a stepped manner from the dot percent density of 0% to 100%. To clearly indicate the density range, the density calibration chart has a structure that a color patch of the highest density (100%) is located at the leading end thereof. Moreover, a color patch of the lowest density (0%) is located to a next position. In addition, the intermediated gradation values are arranged in the descending order.

Detailed Description Text (35):
In a first step of the color density adjustment, the color printer is operated to print a density calibration chart for each of Y, M, C and K at the instructed dot percent. The density of each color patch is measured by the densitometer or the like. If the measure value coincides with an object halftone dot %, no process is performed. If they do not coincide with each other, a density calibration table is produced to make the density coincide with the standard so as to correct original data. The density calibration is performed as described above. That is, if the color is too thin as a result of the measurement performed by using the

densitometer, the density calibration table is produced in such a manner that original data is somewhat thickened.

Detailed Description Text (37):
FIG. 10 shows a density calibration chart according to the present invention in which the calibrations in the vicinity of the highlight and that of the shadow are fined. The highest density dot percent of 100% is a gradation value of a 1020-th print engine. Moreover, the lowest density dot percent 0% is a gradation value of a 16-th print engine. The intermediate portion is arranged in such a manner that the illustrated intervals are employed from the shadow to the highlight. The gradation values (applied energy) in the print engine are arranged in such a manner that the intervals of the gradation values in the print engine are narrowed in the vicinities of the shadow and the highlight (for example, dot percents 95% to 75% adjacent to the shadow are reduced by the gradation values of 16 to 24 in the print engine and dot percents 30% to 5% adjacent to the highlight are reduced by the gradation values of 12 to 20 in the print engine). In the halftone range, the intervals of the gradation values are widened (for example, dot percents 75% to 40% are reduced by a gradation value of about 80 in the print engine).

Detailed Description Text (38):
The present invention employs the patch for the density calibration having the structure that the calibrations in the vicinities of the highlight and the shadow are fined when a color printing operation is performed. Therefore, (1) addition of a dot to highlight and (2) incomplete collapse in a solid portion which are easily detected by a user in a case of a halftone dot gradation value can be prevented. Even if the intermediate gradation value is somewhat shifted, a greater permissible range is given as compared with the highlight and shadow. Therefore, any program takes place in a practical operation. Patches for the density calibration having the structure that the calibrations in the vicinities of the highlight and the shadow shown in FIG. 10 are indicated with black dots in the tables shown in FIGS. 8 and 9.

Detailed Description Text (39):
After the correction using the density calibration has been performed, the correction of the density irregularity in the main scanning direction is performed. The correction of the density irregularity in the main scanning direction is schematically performed such that the printed density of an image pattern recorded at a predetermined gradation value is detected. In accordance with the ratio of the obtained printed density and the gradation value, a correction value of the gradation value of image data is determined. In accordance with the correction value, image data is corrected. The process for correcting irregular density in the main scanning direction will now be described with reference to a flow chart shown in FIG. 11.

Detailed Description Text (53):
In S8 gradation correction values x (H) for all of the gradation values are approximately obtained in accordance with the discrete gradation correction values Xi (H) at the sample gradation values obtained in S5. Specifically, gradation correction values X0 (0), X1 (0), X2 (0), X3 (0) and X4 (0) of the same pixel (for example, a pixel of H=0) are used to subject the gradation correction values among sample gradation values to an interpolation process, for example, a linear interpolation, spline interpolation or interpolation using a usual and arbitrary function. Thus, the gradation correction value is inserted so that the gradation correction value x (H) for all of the gradation values is obtained. As a result of the above-mentioned interpolation process, an accurate gradation correction value can be obtained. Thus, the process for calculating the gradation correction value can be simplified.

CLAIMS:

9. An image correction method according to claim 1, wherein a plurality of gray charts including a first gray pattern formed by C, M and Y and a second gray pattern formed by K in such a manner that a required color tone of the first gray pattern is realized and corresponding to different densities are prepared,

a density of each gray chart is read by a color scanner to measure characteristics of reflection intensities with respect to wavelengths, and

a CMS table to which a reference is made when the CMS conversion is performed is corrected in accordance with the measured characteristics of the reflection intensities.

10. An image correction method according to claim 2, wherein a plurality of gray charts including a first gray pattern formed by C, M and Y and a second gray pattern formed by K in such a manner that a required color tone of the first gray pattern is realized and corresponding to different densities are prepared,

a density of each gray chart is read by a color scanner to measure characteristics of reflection intensities with respect to wavelengths, and

a CMS table to which a reference is made when the CMS conversion is performed is corrected in accordance with the measured characteristics of the reflection intensities.

11. An image correction method according to claim 3, wherein a plurality of gray charts including a first gray pattern formed by C, M and Y and a second gray pattern formed by K in such a manner that a required color tone of the first gray pattern is realized and corresponding to different densities are prepared,

a density of each gray chart is read by a color scanner to measure characteristics of reflection intensities with respect to wavelengths, and

a CMS table to which a reference is made when the CMS conversion is performed is corrected in accordance with the measured characteristics of the reflection intensities.

12. An image correction method according to claim 4, wherein a plurality of gray charts including a first gray pattern formed by C, M and Y and a second gray pattern formed by K in such a manner that a required color tone of the first gray pattern is realized and corresponding to different densities are prepared,

a density of each gray chart is read by a color scanner to measure characteristics of reflection intensities with respect to wavelengths, and

a CMS table to which a reference is made when the CMS conversion is performed is corrected in accordance with the measured characteristics of the reflection intensities.

13. An image correction method according to claim 5, wherein a plurality of gray charts including a first gray pattern formed by C, M and Y and a second gray pattern formed by K in such a manner that a required color tone of the first gray pattern is realized and corresponding to different densities are prepared,

a density of each gray chart is read by a color scanner to measure characteristics of reflection intensities with respect to wavelengths, and

a CMS table to which a reference is made when the CMS conversion is performed is corrected in accordance with the measured characteristics of the reflection intensities.

14. An image correction method according to claim 6, wherein a plurality of gray charts including a first gray pattern formed by C, M and Y and a second gray pattern formed by K in such a manner that a required color tone of the first gray pattern is realized and corresponding to different densities are prepared,

a density of each gray chart is read by a color scanner to measure characteristics of reflection intensities with respect to wavelengths, and

a CMS table to which a reference is made when the CMS conversion is performed is corrected in accordance with the measured characteristics of the reflection intensities.

15. An image correction method according to claim 7, wherein a plurality of gray charts including a first gray pattern formed by C, M and Y and a second gray pattern formed by K in such a manner that a required color tone of the first gray pattern is realized and corresponding to different densities are prepared,

a density of each gray chart is read by a color scanner to measure characteristics of reflection intensities with respect to wavelengths, and

a CMS table to which a reference is made when the CMS conversion is performed is corrected in accordance with the measured characteristics of the reflection intensities.

16. An image correction method according to claim 8, wherein a plurality of gray charts including a first gray pattern formed by C, M and Y and a second gray pattern formed by K in such a manner that a required color tone of the first gray pattern is realized and corresponding to different densities are prepared,

a density of each gray chart is read by a color scanner to measure characteristics of reflection intensities with respect to wavelengths, and

a CMS table to which a reference is made when the CMS conversion is performed is corrected in accordance with the measured characteristics of the reflection intensities.

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L11: Entry 10 of 39 File: USPT Nov 21, 2000

DOCUMENT-IDENTIFIER: US 6151410 A
TITLE: Image processing apparatus, image processing method and medium for storing image-processing control program

Application Filing Date (1):
19971113

Brief Summary Text (24):
In order to achieve the other object of the present invention described above, a characteristic uniforming means employed in the image processing apparatus provided by the present invention is designed into a configuration wherein only picture elements approximated by the gradation-color-specification data are treated as objects for tabulating a sample-count distribution.

Brief Summary Text (27):
In this way, according to the present invention, only picture elements approximated by the gradation-color-specification data are picked up to be used in formation of a judgment on characteristics. Accordingly, the present invention is also effective for recognition of variations in characteristic.

Brief Summary Text (54):
As an example of correcting the brightness, the characteristic uniforming means can be designed into a configuration wherein a gradation located approximately at the center position of the sample-count distribution is compared with a predetermined gradation in order to form a judgment as to whether the image is bright or dark.

Brief Summary Text (55):
In the present invention with a configuration described above, the characteristic uniforming means compares a gradation located approximately at the center position of the sample-count distribution with a predetermined gradation in an effective gradation range in order to form a judgment as to whether the image is bright or dark.

Brief Summary Text (56):
For example, a median gradation obtained during a process to create a sample-count distribution satisfies conditions of being regarded as a gradation located approximately at the center position of the sample-count distribution. By determining whether such a median gradation is higher or lower than a center gradation of the entire gradation range, it is possible to form a judgment as to whether the degree of brightness is high or low.

Brief Summary Text (57):
As a result, according to the present invention, a gradation located approximately at the center position of a sample-count distribution can be used as a criterion to form a judgment as to whether the degree of brightness is high or low with ease.

Brief Summary Text (117):
Assume, as an example, a printer driver wherein image data composed of a dot matrix as represented by gradation-color-specification data comprising all but equal color components is transformed into image data adjusted to printing ink to be printed on

a predetermined color printer. Also in the configuration of the printer driver, a statistical quantity representing a sample-count distribution of the gradation-color-specification data is found for each color component, characteristics of the color components are uniformed by using the statistical quantity as a base and image data made uniform in this way is printed.

Brief Summary Text (118):
As described above, the printer driver transforms image data supplied thereto into image data adjusted to printing ink to be printed on a color printer. At that time, a sample-count distribution of the image data is found for each color component and the transformation is carried out so as to uniform characteristics identified from the sample-count distributions among the color components prior to the printing. To put it in detail, the sample-count distributions found for the color components are compared with each other and then corrected so as to make the sample-count distributions uniform. As a result, the balance of color as a whole is adjusted and, at the same time, good component colors are generated from individual picture elements.

Brief Summary Text (119):
In addition, the printer driver for transforming image data supplied thereto as gradation-color-specification data composed of all but equal color components into image data adjusted to printing ink to be printed on a predetermined color printer can be designed into a configuration wherein a color slippage of the gradation-color-specification data is found from slippages in value among color components in low-brightness and high-brightness zones of the image data supplied thereto and color-component values of the gradation-color-specification data are individually corrected to absorb the recognized color slippage.

Brief Summary Text (120):
That is, the printer driver transforms image data supplied thereto into image data adjusted to printing ink to be printed on a color printer. At that time, a color slippage is found in the so-called colorless portions such as the low-brightness and high-brightness zones. Then, color-component values of the gradation-color-specification data are individually corrected so as to absorb the recognized color slippage prior to the printing.

Detailed Description Text (28):
FIGS. 15A to 15C are each a diagram showing an example of a picture-element-count distribution of a business graph. Likewise, FIGS. 15D to 15F are each a diagram showing an example of a picture-element-count distribution of a natural picture. As is obvious from these examples, the picture-element-count distribution of a non-natural picture is a line spectrum. In processing carried out by the computer 21, all the gradations are searched for ones with a non-zero picture-element count and the number of gradations with a non-zero picture-element count is counted and added up for each color component. In the case of a natural picture, the picture-element-count distribution can be considered to be all but uniform over all the gradations for all color components. Thus, the number of gradations with a non-zero picture-element count for the three color components is 768 (=256 per color component.times.3 color components) in most cases. In the case of a business graph, on the other hand, the number of gradations with a non-zero picture-element count for the three color components is only a number of the order of 60 (=20 per color component.times.3 color components) even if the number of colors used in each color component is assumed to be as many as 20. Thus, a threshold value of 200 can be used as an appropriate criterion as to whether an image is a natural or a non-natural picture. That is, if the number of gradations with a non-zero picture-element count for the three color components of an image is equal to or smaller than 200, the image can be judged to be a non-natural picture. If the number of gradations with a non-zero picture-element count for the three color components of an image is greater than 200, on the other hand, the image can be judged to be a natural picture. In the case of a non-natural picture, the flow of processing goes

on from the step S108 to the step S106 to carry out the other processing as is the case with a binary data image. It is needless to say that the threshold value can be set at a number other than 200.

Detailed Description Text (102):
When an image is taken by using an instrument such as the scanner 11 shown in FIG. 2, image data representing the image in terms of RGB gradation data is supplied to the computer 21. The CPU employed in the computer 21 executes an image processing program represented by the flowcharts shown in FIGS. 5 and 6, carrying out processing to correct the color reproducibility of the image data.

Detailed Description Text (119):
In addition, color slippages can be absorbed on the output side regardless of the input equipment. For example, a printer driver shown in FIG. 35 comprises a rasteriser 21a1 for cutting out a scanning range of a printing head employed in the printer from image data output by a printing application, a color transforming unit 21a2 for transforming RGB gradation-color-specification data into CMY gradation-color-specification data by referring to a color transformation table for all picture elements in the scanning range and a gradation transforming unit 21a3 for transforming gradations of the CMY gradation-color-specification data into those of binary data as is the case with an ordinary printer driver. However, a color correcting module 21b for correcting color slippages of image data is included at a stage in front of the rasteriser 21a1. By having such a configuration, image data can be printed with problems of color slippages solved at the printing time without regard to what image data has been supplied to the printer.

CLAIMS:

1. An image processing apparatus for carrying out predetermined transformation processing on an input comprising component values of image data produced as gradation-color-specification data composed of color components of an image, thereby representing said image as a set of picture elements arranged to form a dot matrix, producing an output from said transformation processing and carrying out transformation based on a relation between said input and said output to correct a balance of color, said image processing apparatus employing a characteristic uniforming means wherein a distribution of said gradation-color-specification data is found for each of said color components, said characteristic uniforming means treats only picture elements approximated by said gradation-color-specification data for each of said color components as an object for finding said distribution, a slippage among said color components is recognized and said recognized slippage is used as a basis for making characteristics uniform among said color components.

9. An image processing apparatus according to claim 8 wherein said characteristic uniforming means forms a judgment as to whether an image is bright or dark by comparing a gradation approximately at the center of the range of each of said distributions with a predetermined gradation.

22. An image processing method for carrying out predetermined transformation processing on an input comprising component values of image data produced as gradation-color-specification data composed of color components of an image, thereby representing said image as a set of picture elements arranged to form a dot matrix, producing an output from said transformation processing and carrying out transformation based on a relation between said input and said output to correct a balance of color, said method comprising the steps of:

finding a distribution of said gradation-color-specification data for each of said color components;

treating only picture elements approximated by said gradation-color-specification data for each of said color components as an object for finding said distribution;

recognizing a slippage among said color components; and

using said recognized slippage as a basis for making characteristics uniform among said color components.

23. A medium for storing an image processing program for carrying out predetermined transformation processing on an input comprising component values of image data produced as gradation-color-specification data composed of color components of an image, thereby representing said image as a set of picture elements arranged to form a dot matrix, producing an output from said transformation processing and carrying out transformation based on a relation between said input and said output to correct a balance of color, said program comprising the steps of:

finding a distribution of said gradation-color-specification data for each of said color components;

treating only picture elements approximated by said gradation-color-specification data for each of said color components as an object for finding said distribution;

recognizing a slippage among said color components; and

using said recognized slippage as a basis for making characteristics uniform among said color components.

First Hit Fwd Refs

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L11: Entry 26 of 39 File: USPT Jun 7, 1994

DOCUMENT-IDENTIFIER: US 5319433 A
**** See image for Certificate of Correction ****
TITLE: Electrophotographing apparatus for forming color image

Abstract Text (2):
In consideration of the dark attenuation characteristics of an electrophotographing photosensitive member, the present invention performs fine color adjustments according to each color of an developing image. In this adjustment, the gradation is corrected, or the color is corrected, per color in accordance with the dark attenuation characteristic.

Application Filing Date (1):
19930518

Detailed Description Text (9):
At first, the photosensitive drum 2 rotates in the direction indicated by an arrow R1 to cause the dielectric transfer sheet 11a on the transfer drum 11 which is in contact therewith to rotate also in the direction indicated by an arrow R2. After the photosensitive surface 2a of the photosensitive drum 2 is deelectrified by the front exposure lamp 10, the surface is charged by the electrostatic charger 3 and modulated by black image signals. Then, a black electrostatic latent image is formed on the photosensitive surface 2a by a laser light carrying the digital optical information that is obtained by the polygon scanner 5 of an exposing device 5, and a toner image is formed by applying a black developer (toner) by the developing device 6Bk to this electrostatic latent image.

Detailed Description Text (17):
In FIG. 4 which schematically shows the elapsed time and the surface potential with the charging position M1 as its reference, the elapsed time corresponding to each of the arrangement distances to the developing devices 6Y, 6C, 6M, and 6Bk is measured by linearly interpolating the first rotation potential and the second rotation potential on the photosensitive drum 2 having the dark attenuation characteristic 1. Thus, the dark attenuation amount corresponding to each of the developing devices 6Y, 6C, 6M, and 6Bk is estimated. When the dark attenuation amounts are thus estimated, the gradient tonality of the intermediate tone can also be estimated in each of the arrangement positions of the developing devices 6Y, 6C, 6M, and 6 Bk. Then, the LUT suitable for each of the intermediate gradient tonalities is selected by the LUT switching means 40 to execute the intermediate gradient correction for each color.

Detailed Description Text (30):
In all of the above-mentioned embodiments, the description has been made of the case where the photosensitive dram 2 or the photosensitive belt 41 i exposed by use of a laser beam, and the so-called inverted development in which toners are applied by the developing devices 6 to the regions thus exposed is adopted. It is readily understandable, however, that the present invention is applicable to an image recording apparatus using a regular development where a toner is also applied to the dark region, that is, the photosensitive region which is not exposed.

Detailed Description Text (37):

The dark attenuation characteristic curve is calculated in accordance with the initial surface potential transmitted to the color converting coefficient switching means 53 and the final surface potential. FIG. 10 shows an example in which a linear interpolation is applied to calculating the aforesaid dark attenuation characteristic curve. However, this interpolating method is not necessarily limited to the linear interpolation. The potentials are obtained when a latent image reaches each of the developing devices using the dark attenuation characteristic curve. Then, by the results thereof, the intermediate gradient tonality is estimated.